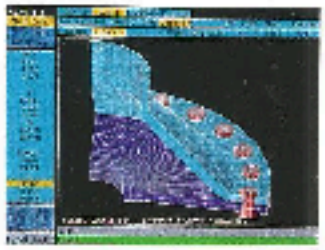
Because you require a full-featured finite element program regardless of the hardware platform you're running on, Swanson Analysis Systems, Inc. ported the ANSYS® code to personal computers. Now you can use this comprehensive program, previously available only on mainframes and workstations, on your 386™ microprocessor-based PC.

The ANSYS Advantage

- This combination of PC hardware and ANSYS software translates into affordable FEA technology—ideal if you need mainframe capabilities, functionality, and quality in the PC environment. With your PC and the wide range of ANSYS program capabilities, you can verify your product design earlier in its development cycle and get your product to market faster.
- If you're already running the ANSYS program on mainframes or workstations, you can conveniently upload your PC data to these other platforms for compute-intensive analyses or conversely, off load ANSYS jobs from an overburdened mainframe. And, since all versions of the program are identical, regardless of the hardware platform, there's no need to learn more than one command/procedure set.
- If you're a new ANSYS customer, you'll become productive quickly with the help of an innovative user interface. You can concentrate on the ANSYS capabilities you need, increasing your learning speed and decreasing your analysis time.
- The ANSYS program is the sole product of Swanson Analysis Systems, Inc. (SASI), a company that has been in business since 1970. Developed and maintained by SASI, the ANSYS program is based on proven engineering concepts that make it a solid computer-aided engineering tool. SASI and its distributor network stand behind the program's high-quality capabilities with responsive customer support and a commitment to meet your analysis requirements.

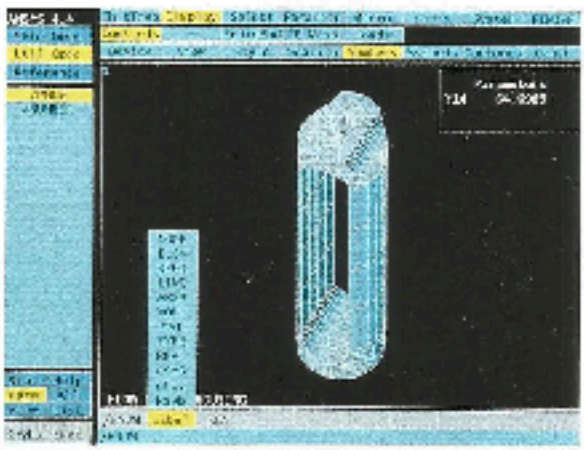
FEA Capabilities

- Since the ANSYS program encompasses a full set of FEA features, it may be the only program you need. Standard analysis types include statics, dynamics, heat transfer, magnetics, coupled field, and piezoelectrics. Design optimization, composites, and buckling capabilities are also provided in this one package. The ANSYS program is also noted for its nonlinear analysis capabilities such as nonlinear material behavior, which encompasses plasticity, creep, swelling, and nonlinear elasticity. Or, depending on the analysis, nonlinear geometric effects including large deflections and interfaces (gaps) can be studied.
- You can define a finite element model quickly, easily, and completely in the ANSYS preprocessing phase. With the solid modeling capabilities, you can describe the model geometry



Top: Deformed shape of the crankshaft assembly shown in the undeformed shape. Bottom: Contour plot of the stress components in the crankshaft assembly. Both plots were created using the ANSYS program.

Because the ANSYS program is available on many hardware systems, you can easily transfer models between computers.



Shown here is a finite element model of a connecting rod. The model consists of 2203 finite elements and 10 node tetrahedral elements. Both the menu system used to access commands and topic options and ANSYS reference information

and then automatically mesh your model. Approximately 80 distinct 2- and 3-D elements are at your disposal for model generation. The ANSYS program's parametric language frees you from repetitive modeling tasks and facilitates model regeneration if changes are needed. For even more flexibility in building your model, you can interface the ANSYS program with major CAD packages.

- Once the analysis is run, you can examine the results with the ANSYS postprocessor by using the interactive color graphics. You can also evaluate the accuracy of your solution with the ANSYS program's error approximation capabilities.
- You won't find another FEA code that offers you such a broad range of features. And, you can choose from the same set of capabilities as the mainframe or workstation version of the ANSYS program, with the minor exception of user-programmed routines and digitized input.

Required Hardware Configuration

Computer:
- A 386 microprocessor-based system, such as one of the following or a 100% compatible:
  IBM® PS/2® (Model 70 and above)
  COMPAQ DESKPRO 386®
  Hewlett-Packard Vectra
  NEC PowerMate™ 386

Memory:
- Main: 640K
- Extended: 4MB recommended

Disk Drive:
- 100MB minimum hard disk drive
- Diskette: 5.6" HD or 3.6" HD

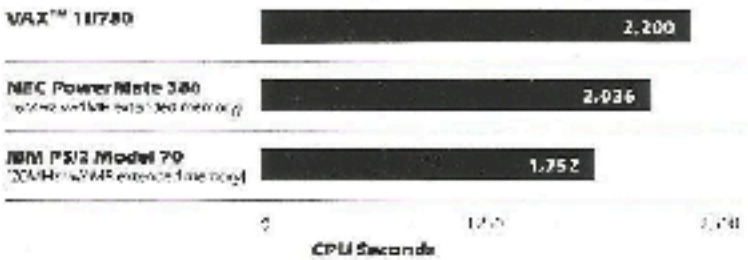
Operating System:
- PC-DOS or
- MS-DOS® (Rev. 3.2 or above)

Graphics:
- EGA (Enhanced Graphics Adapter) resolution: 640 x 350
- VGA (Video Graphics Array) resolution: 640 x 480
- SuperEGA (some versions) supported.
- Large number of graphics devices supported through HALO™ graphics software in stand-alone display program.

Other:
- Parallel printer port.
- Intel 80387 math coprocessor
- Microsoft® mouse or 100% compatible

Performance

- The ANSYS program running on personal computers performs well compared to minicomputers.



Solution times refer to a model with 1020 3-D solid elements, a maximum node number of 2881 with 4889 active DOF, non-linear steps, a maximum wavefront of 185. Data processing (I/O) time of approximately 5% is included.

Standard Program Development, Verification, and Customer Support

- The ANSYS program continues to be refined and enhanced through ongoing development. When possible, development is targeted to your particular computer to take advantage of unique features, such as those that may increase performance.
- Each revision of the ANSYS program is verified with 2000 test cases. In addition, each platform on which the program runs receives further testing. The 386 microprocessor-based version of the ANSYS program undergoes the same level of testing as a version running on a workstation or mainframe computer before it is released to you.
- Along with the full-featured capabilities of the ANSYS program, you're also entitled to full-featured program support from your ANSYS Support Distributor. Services include a telephone hotline, training, and documentation.

The ANSYS Opportunity

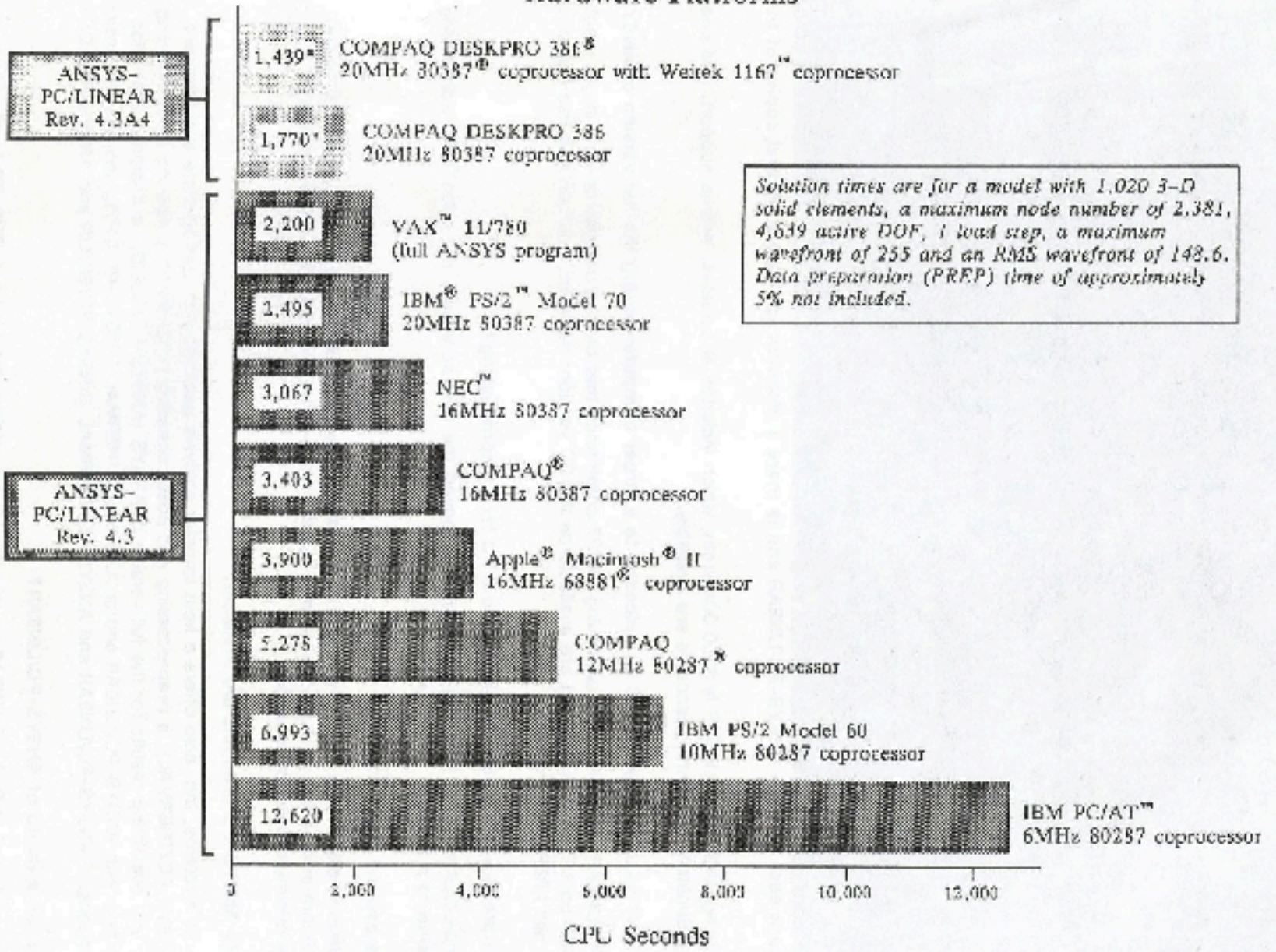
- Put the power and reliability of finite element analysis within your reach by either leasing or purchasing the ANSYS program on 386 microprocessor-based personal computers. Take the opportunity to apply this complete design and analysis package to your engineering challenges. Call your ANSYS Support Distributor today.

Swanson Analysis Systems, Inc.
Johnson River, P.O. Box 65
Houston, PA 15342-0065
TWX: 510-690-8655
FAX: (412) 746-9494
Phone: (412) 746-3304

ANSYS is a registered trademark of Swanson Analysis Systems, Inc.
IBM is a registered trademark of International Business Machines Corporation. PS/2 is a trademark of International Business Machines Corporation. COMPAQ DESKPRO 386 is a registered trademark of Compaq Computer Corporation. NEC PowerMate is a trademark of NEC Information Systems, Inc. Microsoft and MS-DOS are registered trademarks of Microsoft Corporation. HALO is a trademark of Media Cybernetics. VAX is a trademark of Digital Equipment Corporation.
©1988 Swanson Analysis Systems, Inc.

P/N 002760
Printed in U.S.A.
All Rights Reserved

ANSYS–PC/LINEAR Benchmark Results on Various Hardware Platforms



Solution times are for a model with 1,020 3-D solid elements, a maximum node number of 2,381, 4,639 active DOF, 1 load step, a maximum wavefront of 255 and an RMS wavefront of 142.6. Data preparation (PREP) time of approximately 5% not included.

COMPAQ DESKPRO 386 and COMPAQ are registered trademarks of Compaq Computer Corporation.
80387 and 80287 are registered trademarks of Intel Corporation.
Weitek 1167 is a trademark of Weitek Corporation.
VAX is a trademark of Digital Equipment Corporation.

IBM is a registered trademark of International Business Machines Corporation.
PS/2 and PC/AT are trademarks of International Business Machines Corporation.
NEC is a trademark of Nippon Electric Corporation.
Apple and Macintosh are registered trademarks of Apple Computer Inc.
68881 is a registered trademark of Motorola, Inc.

*Preliminary

Frequently Asked Questions about ANSYS®-PC/LINEAR

1. **What is ANSYS-PC/LINEAR?**

ANSYS-PC/LINEAR is a subset of ANSYS, the powerful general purpose finite element program, which runs on a personal computer. It can solve multiple loadstep linear static problems, linear transient dynamic and harmonic response analysis using modal superposition, and modal analysis including a spectrum option.

2. **Does ANSYS-PC/LINEAR go through the same rigorous quality assurance program as the full version of ANSYS?**

Yes, before any new revision of ANSYS-PC/LINEAR is released, it goes through the applicable quality assurance tests that the full version of ANSYS goes through.

3. **Will we have to learn a new command language to use ANSYS-PC/LINEAR?**

No, the command language is the same as full ANSYS.

4. **Does ANSYS-PC/LINEAR run on computers other than IBM® PC/AT™ and PC/XT™ and PS/2™?**

Yes, if the computer is a true IBM compatible. Be sure to review the minimum requirements, such as the math coprocessor chip and the hard disk.

5. **What does it cost to lease ANSYS-PC/LINEAR and is there a discount for leasing several copies of the program?**

The cost of leasing ANSYS-PC/LINEAR is $300.00/month, which includes all updates, hotline support, and one training credit. Substantial quantity discounts are available.

6. **Can the input generated on the PC be uploaded to a larger computer having the full version of ANSYS?**

Yes, ANSYS-PC/LINEAR can write a file containing PREP7 commands that can be transferred to a larger machine. This file can only contain commands that are available on the PC version; however, you can edit this file to include other valid PREP7 commands.

7. **Can a postprocessing file be downloaded to a PC for postprocessing?**

Yes, ANSYS-PC/LINEAR comes with utility programs to convert the postprocessing file (File12) for transferring from a mainframe to a PC, and vice versa.

8. **How large can my problem be?**

Nodes and elements are limited only by available disk space. The frontal solver can have no more than 800 degrees of freedom in memory at any point in time. Disk space will be the most limiting factor with 20 megabytes the minimum recommendation.

9. **What other ANSYS-PC products are available?**

Swanson Analysis Systems, Inc. also offers a heat transfer analysis package with steady-state and transient capabilities (ANSYS-PC/THERMAL), a preprocessing and postprocessing program for preparing input including solid modeling and evaluating results for the full version of ANSYS (ANSYS-PC/SOLID), a design optimization program that works with ANSYS-PC/LINEAR and/or ANSYS-PC/THERMAL (ANSYS-PC/OPT), and two-dimensional educational versions of ANSYS-PC/LINEAR and ANSYS-PC/THERMAL (ANSYS-PC/ED/LIN and ANSYS-PC/ED/TH).

10. **How can I see a demo of ANSYS-PC/LINEAR?**

You can see examples of ANSYS-PC/LINEAR by receiving a <u>free</u> demo disk of the ANSYS-PC family of products. Contact your ANSYS Support Distributor (ASD) and let him know of your interest. If you're not sure who the ANSYS Support Distributor is for your area, please call SASI at (412) 746-3304.

ANSYS is a registered trademark of Swanson Analysis Systems, Inc.; IBM is a registered trademark of International Business Machines Corporation; PC/AT, PC/XT, and PS/2 are trademarks of International Business Machines Corporation.

ANSYS-PC PROGRAMS and MATERIALS

Swanson Analysis Systems, Inc., offers a family of personal computer finite element analysis software products, all functional subsets of the full ANSYS® program. These ANSYS-PC programs can be used for a wide range of static, dynamic, and heat transfer analyses. They are available for the IBM® PC XT™, PC AT®, the IBM PS/2®, and the COMPAQ DESKPRO 286® or 386®, or compatibles. Brief descriptions of the ANSYS-PC products follow. An order form on the reverse side of this sheet may be used to request additional information or to place your order.

COMPLETE FINITE ELEMENT ANALYSIS PC PROGRAMS:

ANSYS-PC/LINEAR 4.3

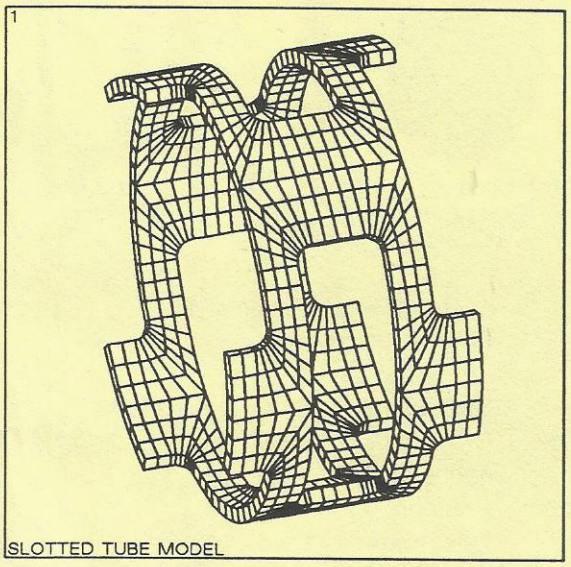
This complete three-dimensional program contains interactive graphics, preprocessing, and postprocessing for linear and nonlinear static, modal, harmonic response, random vibration, and transient dynamic analyses. It can be used as a stand-alone program or, since all data input is compatible between ANSYS and ANSYS-PC/LINEAR 4.3, the PC version can prepare models for ANSYS analyses on workstation or mainframe computers. The license includes all updates, hotline support, an *ANSYS-PC/LINEAR User's Manual,* and one day of training.

The *ANSYS-PC/LINEAR User's Manual* consists of a 32-page "Getting Started" booklet, a 180-page "ANSYS Primer for Stress Analysis" which is a beginner's guide to ANSYS, and a 700-page "Reference" manual containing a complete program description. Installation instructions, general usage guidelines, finite element concepts, and example problems with solutions are also included.

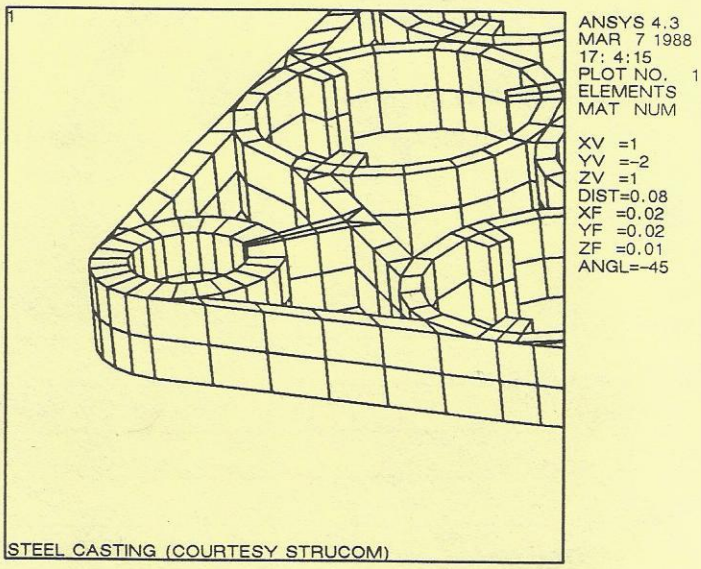
ANSYS-PC/THERMAL 4.3

ANSYS-PC/THERMAL 4.3 is a three-dimensional heat transfer analysis program containing interactive graphics, preprocessing, and postprocessing with linear and nonlinear steady-state and transient capabilities. It can handle temperature-dependent material properties as well as convection, conduction, and radiation. The element library includes solids, shells, lumped thermal masses, and conduction, radiation, and convection links. An ANSYS-PC/THERMAL license includes all updates, hotline support, an *ANSYS-PC/THERMAL User's Manual*, and one day of training.

The *ANSYS-PC/THERMAL User's Manual* consists of a "Getting Started" booklet, an "ANSYS Primer for Thermal Analysis," and a "Reference" manual containing a complete program description. Installation instructions, general usage guidelines, finite element concepts, and example problems with solutions are also included.



SLOTTED TUBE MODEL



STEEL CASTING (COURTESY STRUCOM)

ANSYS is a registered trademark of Swanson Analysis Systems, Inc. IBM, PC AT, and PS/2 are registered trademarks of International Business Machines Corporation. PC XT is a trademark of International Business Machines Corporation. COMPAQ DESKPRO 286 and 386 are registered trademarks of Compaq Computer Corporation.

Copyright © 1989, Swanson Analysis Systems, Inc.

ADDITIONAL ANSYS-PC PROGRAMS:

ANSYS-PC/SOLID 4.3

This stand-alone solid modeling package offers pre and postprocessing capabilities. The preprocessing routines can generate a complete input file to the solution phase of ANSYS for all analysis types and elements, including coupling and constraint equations. Solid modeling capabilities, interactive graphics, and the ability to link with CAD systems are additional features. As a postprocessor, the package supports the ANSYS program's most frequently used element types. The program can also enhance data preparation for ANSYS-PC/LINEAR 4.3 and ANSYS-PC/THERMAL 4.3.

ANSYS-PC/OPT 4.3

ANSYS-PC/OPT 4.3 tests a selected design and suggests improved designs based on optimization theory. This program is designed to be used in conjunction with ANSYS-PC/LINEAR 4.3 or ANSYS-PC/THERMAL 4.3.

EDUCATIONAL VERSIONS OF ANSYS-PC PROGRAMS:

ANSYS-PC/ED/LIN and **ANSYS-PC/ED/TH**

Both of these ANSYS-PC programs are excellent educational tools for finite element training and demonstrations. ANSYS-PC/ED/LIN is a two-dimensional educational version of ANSYS-PC/LINEAR. ANSYS-PC/ED/TH is a two-dimensional educational version of ANSYS-PC/THERMAL. Neither program may be used for commercial purposes. The single user purchase price for either program is $100.00 (user's manual included). Multiple copies are discounted. These programs are currently available at Revision 4.3.

Complete the form below to request additional ANSYS-PC material or if you would like to receive license information. Be sure to list your telephone number in case we need to contact you.

- ☐ Send me information on ANSYS-PC/ED/LIN or ANSYS-PC/ED/TH.
- ☐ Send me the free ANSYS-PC demo disk which highlights the features of the ANSYS-PC programs.
- ☐ Have an ANSYS Support Distributor (ASD) in my area contact me.
- ☐ Send me a Documentation Guide and Order Form.

Please send contract information for:

- ☐ ANSYS-PC/LINEAR 4.3
- ☐ ANSYS-PC/THERMAL 4.3
- ☐ ANSYS-PC/OPT 4.3
- ☐ ANSYS-PC/SOLID 4.3
- ☐ ANSYS (the full program) on a _____ computer.

NAME:_____

COMPANY: _____

ADDRESS: _____

_____

_____

CITY, STATE:_____

ZIP:_____TELEPHONE:_____

Please return to:

Swanson Analysis Systems, Inc.
P.O. Box 65
Johnson Road
Houston, PA 15342
Telephone: (412) 746-3304
Fax: (412) 746-9494

Att: The Marketing Group